

## **REMARKS**

### **Status of the Claims**

Claims 6-10 are now present in this application. Claim 6 is independent.

Claims 6-10 have been amended. Reconsideration of this application is respectfully requested.

### **Claim Objections**

The Examiner has objected to claim 6 because of minor informalities.

### **Claim Amendments**

Applicants have amended the claims in order to correct minor typographical errors, and to place the claims in better form. The claim amendments are not being made in response to any statutory requirement for patentability, and have not been narrowed in scope. Instead, the claims have been amended merely to recite the subject matter therein more clearly.

### **Rejection Under 35 U.S.C. § 102**

Claims 6-10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hasegawa et al. ("An Experimental Realization of Quantum Cryptosystem")[hereinafter "Hasegawa"]. This rejection is respectfully traversed.

For a Section 102 rejection to be proper, the cited reference must teach or suggest each and every claimed element. *See M.P.E.P. 2131; M.P.E.P. 706.02*. Thus, if the cited reference fails to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In this instance, Hasegawa fails to teach or suggest each and every claimed element.

For example, independent claim 6 recites that the quantum receiver apparatus includes, *inter alia*, "a bypass optical path including a phase modulator which is provided at a port

connected to the quantum communication path, and phase-modulates only the reference optical pulse received after the time difference twin photon pulses are reciprocated via the quantum communication path between the quantum transmitter apparatus and the quantum receiver apparatus” and that the quantum transmitter apparatus includes, *inter alia*, “a beam attenuating means for attenuating the signal optical pulse such that the signal optical pulse includes less than two photons in the pulse.” (*Emphasis added.*)

It is respectfully submitted that Hasegawa fails to teach or suggest the above-identified features of independent claim 6.

In the Office Action, the Examiner states with respect to the Hasegawa reference, “figure 2 and associated description . . . clearly encompasses the claimed limitations as broadly interpreted by the examiner.” (See page 3, section 6 of the Office Action.) Applicants respectfully disagree with the Examiner.

Applicants submit that the Examiner’s broadest interpretation of the claimed limitations is not consistent with the interpretation that those skilled in the art would reach. More specifically, even if the claimed limitations are broadly interpreted, it is respectfully submitted that Hasegawa fails to teach or suggest, that the quantum receiver apparatus includes, *inter alia*, “a bypass optical path including a phase modulator which is provided at a port connected to the quantum communication path, and phase-modulates only the reference optical pulse received after the time difference twin photon pulses are reciprocated via the quantum communication path between the quantum transmitter apparatus and the quantum receiver apparatus”. (*Emphasis added.*)

In Fig. 2, Hasegawa discloses a Mach-Zehnder interferometer based quantum cryptosystem (QC system) which includes a transmitter side QC device (Alice’s side) and receiver side QC device (Bob’s side). The QC system also includes, among other features, two couplers C1, C2, a polarization beam splitter PBS, a Faraday mirror FM, phase modulators PMA (Alice’s side), PMB (Bob’s side).

Hasegawa does not teach that the phase modulator PMB of the receiver side QC device phase-modulates only the reference optical pulse received after the time difference twin photon pulses are reciprocated via the quantum communication path between the quantum transmitter

apparatus and the quantum receiver apparatus. Rather, Hasegawa discloses that a pulse emitted at a laser source is split at the coupler C2 where the first pulse travels through the short arm and is transmitted at PBS and then goes, through an optical fiber, into Alice's side and reflected back orthogonally polarized by a the FM. After that, the first pulse goes back into a long arm and be modulated by a phase shift with the PMB to reach C2. (*See the paragraph bridging pages 151 and 152.*) Again, there is no disclosure in Hasegawa that the phase modulator PMB of the receiver side QC device phase-modulates only the reference optical pulse received after the time difference twin photon pulses are reciprocated via the quantum communication path between the quantum transmitter apparatus and the quantum receiver apparatus.

Further, it is respectfully submitted that Hasegawa fails to teach or suggest, that the quantum transmitter apparatus includes, *inter alia*, "a beam attenuating means for attenuating the signal optical pulse such that the signal optical pulse includes less than two photons in the pulse." (*Emphasis added.*)

In this instance, Hasegawa discloses that a polarization controller (PC), an isolator, and an attenuator are placed before the coupler C1 included in Bob's QC device (*see page 151, col. 2, last full paragraph*). Hasegawa, however, fails to teach that Alice's QC device (transmitter side QC device) includes, *inter alia*, "a beam attenuating means for attenuating the signal optical pulse such that the signal optical pulse includes less than two photons in the pulse." (*Emphasis added.*) Indeed, in Hasegawa, the attenuator is placed in the receiver side, not in the transmitter side.

Therefore, for at least these reasons, independent claim 6 is distinguishable from Hasegawa. Claims 7-10 depend from claim 6, directly or indirectly. Therefore, for at least the reasons stated with respect to claim 6 and in further in view of novel features recited therein, claims 7-10 are also distinguishable from Hasegawa.

**Conclusion**

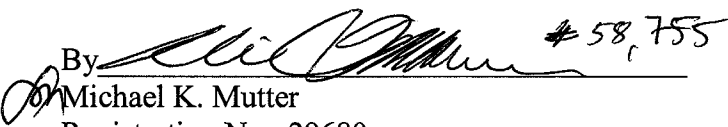
All rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Ali Imam, Registration No. 58755 at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

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